

## CLAIMS

1. A method of production of astaxanthin by fermentation, characterized by the cultivation of the strains of *X. dendrorhous* that are shown in Scheme 2 of the description or their mutants or transformed derivatives capable of producing, in a flask, at least 4000 ppm of astaxanthin at days 6-7 of fermentation.

2. A method of fermentation according to claim 1, characterized in that, in industrial fermentation, a yield of at least 5000 ppm of astaxanthin is reached at days 7-9 of fermentation.

3. A method of fermentation according to claims 1 and 2, characterized in that duroquinone is added during the fermentation process.

4. A method of fermentation according to claim 3, characterized in that duroquinone is added at a concentration of 25-50  $\mu$ M.

5. A method of fermentation according to claims 1 and 2, characterized in that retinal is added during the fermentation process.

6. A method of fermentation according to claim 5, characterized in that retinal is added at a concentration of 35  $\mu$ M.

7. A method of fermentation according to claims 1 and 2, characterized in that trisporic acids are added during the fermentation process.

8. A method of fermentation according to claim 7, characterized in that the trisporic acids are added at a concentration of 50-100  $\mu$ g/ml.

9. A method of fermentation according to claims 1 and 2, characterized in that glutamate is added during the fermentation process.

10. A method of fermentation according to claim 9, characterized in that glutamate is added at a concentration of 5.5 mg/ml.

11. A method of fermentation according to claims 1 and 2, characterized in that medium 5 described in

Table I of the description is used for the fermentation process.

12. A method of fermentation according to claim 11, characterized in that 4490 ppm of astaxanthin is produced in a flask at days 6-7 of fermentation.

13. A method of fermentation according to claims 1 to 12, characterized in that the fermentation medium is illuminated during the fermentation process.

14. A method of fermentation according to claim 13, characterized in that the source of illumination used is white light.

15. A method of fermentation according to claim 13, characterized in that the source of illumination used is ultraviolet light.

16. A method of fermentation according to claims 13 to 15, characterized in that illumination is carried out from the start to the end of fermentation, preferably between hours 40 and 200.

17. A method of fermentation according to claim 16, characterized in that cycles of 6 hours of illumination / darkness are used.

18. A method of fermentation according to any of the claims 1 to 17, characterized in that:

- (a) Inocula of *X. dendrorhous* are seeded.
- (b) The inocula of *X. dendrorhous* are cultivated for 48 hours at 20°C.
- (c) Phases of primary culture of *X. dendrorhous* are seeded with about 0.4% (v/v) of the inoculum phase.
- (d) The primary phases of *X. dendrorhous* are cultivated for 48-54 hours at 17-20°C.
- (e) Each fermenter is seeded with 20% (v/v) of the primary phases of *X. dendrorhous*.
- (f) The fermentation is incubated for 60-72 hours at 18-20°C and for the other 5-7 days at 17°C.

19. A method of fermentation according to claim 18, characterized in that at least 425 mg/l of astaxanthin is produced on days 7-9.

5 20. A method of fermentation according to claims 18 and 19, characterized in that concentrations of biomass are produced of at least 50 grams of dry weight of cells per litre of fermentation medium.

10 21. A method of fermentation according to claim 20, characterized in that concentrations of biomass are produced of at least 80 grams of dry weight of cells per litre of fermentation medium.

15 22. A method of fermentation according to claims 18 to 21, characterized in that at least 5000 µg of astaxanthin is produced per gram of dry weight of cells on days 7-9 of fermentation.

23. Biomass of *X. dendrorhous* with nutrient and pigmenting value, obtainable by the fermentation process described in claims 1 to 22, for use in food for humans and animals.

20 24. Biomass according to claim 23, characterized in that it contains:

- a) A concentration of at least 5000 µg/g of astaxanthin;
- b) A concentration of at least 7400 µg/g of total  
25 carotenoids;
- c) A concentration of at least 15% of proteins and
- d) A concentration of at least 15% of  
carbohydrates.

30 25. Compounds for animal food that consist of or contain the biomass of claims 23 and 24.

26. Compounds for human food that consist of or contain the biomass of claims 23 and 24.